



AF/2811 EFW

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Inventor: Yukihiro INOUE Group Art Unit: 2811
Appln. No.: 09/768,556 Examiner: S. Gebremariam
Filed: January 25, 2001
For: SEMICONDUCTOR DEVICE

RESPONSE UNDER 37 CFR § 1.116

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the Final Rejection dated March 3, 2004, the Applicant respectfully request reconsideration and allowance in light of the following remarks.

Applicant wishes to thank the Examiner for the courtesy extended to their representative during a personal interview on May 25, 2004. A summary of the issues discussed during the interview is included below.

Claims 14 and 6 stand rejected, under 35 USC §103(a), as being unpatentable over Pfiester (US 4,918,510) in view of Applicant's Discussion of the Related Art (ADRA). Claims 13 and 5 stand rejected, under 35 USC §103(a), as being unpatentable over Pfiester in view of the ADRA and Nagatoma et al. (US 5,164,806). Claims 11, 12, 7, and 8 stand rejected, under 35 USC

§103(a), as being unpatentable over Pfiester in view of the ADRA, Nagatoma, and Murakami (US 4,819,045). Applicant respectfully traverses.

Claim 14 recites a gate insulator film formed between source and drain side offset diffusion layers such that both ends of the gate insulator film form protruding portions that are substantially perpendicular to a direction from the source side offset diffusion layer to the drain side offset diffusion layer.

The Final Rejection proposes that Pfiester discloses these features in Fig. 3 (Final Rejection page 2, last paragraph). More specifically, the Final Rejection proposes that Pfiester discloses in Fig. 3 a gate insulator film region 48 formed between a source side offset diffusion layer region 44 and a drain side offset diffusion layer region 42 (Final Rejection section 2, lines 3-4 and 7-8). Additionally, the Final Rejection proposes that both ends of gate insulator film region 48 form protruding portions 54 in a direction substantially perpendicular to a direction from source side offset diffusion layer region 44 to drain side offset diffusion layer region 42 (section 2, lines 13-14).

However, as described by Pfiester, Fig. 3 illustrates a cross-section through the structure of Fig. 1 along the line 3-3

(Pfiester col. 2, lines 58-59). As illustrated in Fig. 3, the proposed protruding portions 54 are formed parallel to a direction from source region 44 to drain region 42, not substantially perpendicular to this direction, as required by claim 14. The direction perpendicular to a line segment drawn from drain region 42 to source region 44 is a direction forming a normal intersection with the page on which Fig. 3 is illustrated. Since Fig. 3 is a cross-sectional view, it is incapable of illustrating features extending along a line segment that is perpendicular to the plane of this cross section. As a result, Fig 3. neither illustrates nor is capable of illustrating the proposed feature whereby both ends of a gate insulator film form protruding portions 54 in a direction substantially perpendicular to the direction from drain region 42 to source region 44, as apparently acknowledged on page 3, lines 5-6, of the Final Rejection.

Accordingly, Applicant respectfully submits that Pfiester does not disclose the above described features of claim 14 and the Final Rejection does not propose that the ADRA supplements Pfiester's disclosure in this regard. As a result, the combined teachings of Pfiester and the ADRA do not suggest the structure

defined by claim 14. Therefore, allowance of claim 14 and all claims dependent therefrom is warranted.

Moreover, claim 14 recites that the protruding portions of the gate insulator film make direct contact with a gate electrode. The Final Rejection acknowledges that Pfiester does not disclose this feature, but proposes that the ADRA and the knowledge attributable to one of ordinary skill in the art suggest modifying Pfiester's structure to obtain the feature (Final Rejection page 3, paragraphs 2-4).

However, Pfiester's device cannot be modified in the proposed manner because gate insulators 56 and P-channel drain and source regions 50 and 52 obstruct the path for extending gate electrode 46 to reach the proposed protruding portions 54. It is noted that the claimed protruding portions are portions of the gate insulator film that protrude at borders of the source and drain side offset diffusion layers. As the Final Rejection has applied the claim features to Pfiester's Fig. 3, the proposed protruding portions 54 are the portions of gate insulator 48 extending beyond N-channel drain and source regions 42 and 44, in a direction away from gate electrode 46. As may be seen by inspection of Fig. 3, gate electrode 46 cannot be extended to the proposed protruding portions 54 because gate insulator 56 and P-

channel drain and source regions 50 and 52 extend over the proposed protruding portions 54 and cover a portion of source and drain regions 42 and 44. Should gate insulators 56 and P-channel drain and source regions 50 and 52 be moved to accommodate direct contact between gate electrode 46 and the proposed protruding portions 54, there is no evidence to suggest that Pfiester's modified device would operate.

As to the motivation for combining the teachings of Pfiester and the ADRA to achieve the claimed structure, the Final Rejection proposes that modifying Pfiester's structure to include the proposed ADRA-disclosed feature of providing direct contact between the gate electrode and the proposed protruding portions would increase the breakdown voltage of the modified structure (Final Rejection page 3, fourth paragraph).

However, the ADRA discloses an electrode 9 extending along a line-segment that is perpendicular to a line extending between a source 3a and drain 3b of a semiconductor. Electrode 9 does not cross over the source and drain regions, as may be seen in Fig. 3A of the ADRA. At protruding portions 10 of gate oxide film 8, gate electrode 9 is proposed to make direct contact with protruding portions 10. Instead of applying this configuration to Pfiester's structure, though, the Final Rejection proposes

extending Pfiester's gate electrode 46 in a direction perpendicular to that illustrated in Fig. 3C of the ADRA. Specifically, the Final Rejection proposes extending Pfiester's gate electrode 46 to extend across the N-channel drain and source regions 42 and 44 and displacing gate insulators 56 and P-channel drain and source regions 50 and 52 of Pfiester's structure so that gate electrode 46 may make direct contact with protruding portions 54. In summary, the ADRA teaches a gate electrode that does not cross over the drain and source regions and the Final Rejection proposes that this teaching motivates one of ordinary skill in the art to modify Pfiester's structure so that the gate electrode crosses over the drain and source regions.

Furthermore, although the evidentiary record is silent as to whether the device illustrated in Fig. 3C of the ADRA provides increased breakdown voltage for a semiconductor, the Final Rejection does not apply the teachings of the ADRA in a manner that could be expected to produce the benefits afforded by the ADRA device. Instead, the Final Rejection identifies a single feature proposed to be found in the ADRA and applies this feature to Pfiester's device in a completely different way from that employed in the ADRA. Even assuming, *arguendo*, that the ADRA structure provides an increased breakdown voltage, there is no

reason to believe that applying the proposed feature to Pfiester's structure in a completely different manner than that disclosed in the ADRA would produce the benefit inhering to the ADRA structure. And if the ADRA structure does not provide an increased break down voltage, the evidentiary record fails to provide a basis for believing this benefit can be obtained by extending Pfiester's gate electrode to extend across its corresponding drain and source regions 42 and 44.

In accordance with the above discussion, Applicant respectfully submits that the combined teachings of Pfiester and the ADRA do not suggest the structure defined by claim 14 and do not provide a motivation to produce the claimed structure. Therefore, allowance of claim 14 and all claims dependent therefrom is warranted for this independent reason.

Independent claim 13 recites features similar to those distinguishing claim 14 from the applied references. For similar reasons that claim 14 distinguishes over Pfiester and the ADRA, so too does claim 13. Nagatoma is additionally applied in the rejection of claim 13, but not to supplement the teachings of Pfiester and the ADRA with regard to the above-described distinguishing features. Therefore, allowance of claim 13 and all claims dependent therefrom is warranted.

In view of the above, it is submitted that this application is in condition for allowance and a notice to that effect is respectfully solicited.

If any issues remain which may best be resolved through a telephone communication, the Examiner is requested to telephone the undersigned at the local Washington, D.C. telephone number listed below.

Respectfully submitted,



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Date: June 3, 2004
JEL/DWW/

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